

Annotated List of Pycnogonida collected near Bolinas, California

by

ALAN C. ZIEGLER

Present Address: Department of Zoology, University of California, Berkeley 4, California

The collection of pycnogonids discussed below was made July 2 - 23, 1958, while the author was enrolled in the University of California summer course in invertebrate zoology given by Drs. Ralph I. Smith and Cadet Hand at Bolinas, in Marin County. Duxbury Reef and other rocky intertidal areas within a mile or so of the village of Bolinas were most extensively investigated. Two trips were made to a rocky, exposed shore on the Rodriguez Ranch about seven miles south-east of Bolinas, and one trip was made to the Bodega Harbor jetty at Doran Beach, Sonoma County, about 30 miles north-north-east of Bolinas. A total of almost 300 pycnogonids was obtained during this study. Most of the specimens were collected by the author, but a few, mostly from hydroids, were donated by other students in the class. The specimens were killed by immersion in fresh water, and preserved in 9:1 70% alcohol-glycerine solution. The collections and field notes were donated to the museum of Pacific Marine Station at Dillon Beach. The author wishes to thank Dr. Joel W. Hedgpeth, Director of Pacific Marine Station, for confirmation of identifications and assistance in preparing this paper.

This is the first list of Pycnogonida from the Bolinas area. Twelve species were listed from Dillon Beach by Hedgpeth (1951), some 27 miles north-north-east of Bolinas; of the 11 species here recorded from Bolinas, three are as yet unknown from the Dillon Beach area.

Family PHOXICHILIDIIDAE Sars, 1891

Genus PHOXICHILIDIUM

Milne - Edwards, 1840

Phoxichilidium femoratum (Rathke), 1799

Only one specimen of this species was collected: a female on hydroids at -2 ft. out on Duxbury Reef. This species, as other members of the family, bears chelae in the adult state, and the chelae are situated on chelifores of such a length that the chelae may easily be used to transfer food directly into the mouth of the animal.

Genus HALOSOMA Cole, 1904

Halosoma viridintestinale Cole, 1904

Although this species is reported by Hedgpeth (1951) as being abundant on the "eel grass" (Zostera) and among hydroids of the shallow waters of Tomales Bay and as also occurring in the rocky area north of Dillon Beach, only one specimen was secured in the Bolinas area. This was a female found on the girdle spines of a chiton, Mopalia muscosa, collected on the rocky flat just west of Duxbury Reef at about +2 or +3 feet. The absence of Zostera in the vicinity of Bolinas may account for the apparent scarcity of H. viridintestinale there. Beds of the "surf grass", Phyllospadix, fairly common on the more exposed rocky shores around Bolinas, were searched unsuccessfully for this species.

Genus ANOPLODACTYLUS Wilson, 1878

Anoplodactylus sp.

Five specimens of a small white member of this genus were taken from three lots of hydroids collected at about -1 foot well out on Duxbury Reef. Three of the animals are apparently immature, with the greater portion of the last pair of legs yet unformed, and the abdomen projecting beneath them rather than above them as in the adults. The remaining two specimens are males since they possess ovigers and are at least sub-adult, to judge from the appearance of the ovigers. All pairs of legs are fully formed. This form bears a fairly close resemblance to Anoplodactylus erectus Cole, but has a narrower, less bulbous proboscis.

Family AMMOTHEIDAE Dohrn, 1881

Genus ACHELIA Hodge, 1864

Achelia chelata (Hilton), 1939

A single large adult was taken with six Pycnogonum stearnsi on rock substrate under one or two square feet of Mytilus bed at about +4 feet on Duxbury Reef. This species

is reported as occurring "on Bugula, Pescadero; Moss Beach, San Mateo County" (Light, et al., 1954, p. 208). The point of collection was at least 20 to 30 or more feet from any noticeable hydroid colonies, but several small anemones of the genus Anthopleura were scattered through the mussel bed in the immediate area.

Parasitism of mussels by this species, as reported elsewhere in this journal by Benson, was not noticed during this study, although mussels were used as subjects for the study of molluscan ctenidia by the class.

Achelia gracilipes (Cole), 1904

This small white species was collected only once on the hydroids at Duxbury Reef but was very common, especially on Sertularia, at Rodriguez Ranch beach. Surprisingly, two were also found on the underside of rocks on the Bodega Harbor breakwater, apparently not in close association with hydroids. Half of all of the specimens collected were immature. The scarcity of this form at Bolinas proper is difficult to explain. Hedgpeth's (1951) account of the species also seems to give indications of a spotty distributional pattern.

An immature pycnogonid found on Gracilaria dredged from -5 feet in front of the Coast Guard Station in Bolinas Lagoon is possibly referable to this species. This specimen, incidentally, was the only pycnogonid collected from the lagoon. A very similar species, Achelia nudiusscula, is so far recorded only from San Francisco Bay.

Ammothella tuberculata Cole, 1904

A few specimens were found on hydroids from both the Rodriguez Ranch beach and Duxbury Reef. One specimen was taken from a Phyllospadix root mass from Rodriguez Ranch and another from under a rock on the Bodega Harbor breakwater. This form and the following species are fairly similar in appearance but may be distinguished by the more compact, almost circular, body of A. tuberculata and by the lack of long projections on its chelifore segments. The dorsal projections on the body segments may be either two or three in number and tend to be closer together and more rounded than those of Ammothella menziesi.

Ammothella menziesi Hedgpeth, 1951

Two specimens were taken among hydroids on Duxbury Reef. The body of this species appears rather spindly because of the relatively great separation of the lateral processes. Other distinguishing features are listed in the account of the preceding species. The type locality is Dillon Beach.

Genus LECYTHORHYNCHUS Böhm, 1879

Lecythorhynchus marginatus Cole, 1904

This is one of the most common species on hydroids in crevices along the rocky shore at the base of Duxbury Reef, and it also occurs in some numbers out along the reef. One was taken on hydroids at the Rodriguez Ranch beach, and seven were taken under rocks at the Bodega Harbor breakwater. The animals under rocks did not seem to be moving about but were settled in small cracks and depressions with the legs pulled in close to the body and the "knees" projecting vertically. The large series (37) from Bolinas, when alive, showed various degrees of fine red spotting along the dorsal midline of the body--some had the spotting restricted to the vicinity of the eye tubercle while others exhibited practically a solid line of red from eye tubercle to abdomen. When on Aglaophenia the thin body and the long brown-banded legs cause this animal to closely resemble its surroundings.

Family TANYSTYLIDAE Schimkewitsch, 1913

Genus TANYSTYLUM Miers, 1879

Tanystylum californicum Hilton, 1939

Many individuals of this species were found in hydroids both on Duxbury Reef and, less commonly, along the rocky shore at its base. However, only one specimen was taken at Rodriguez Ranch beach where the species seemed to be replaced on the hydroids by Achelia gracilipes.

The adults of Tanystylum californicum are generally light brown in color and have three spines on the "heel" of the propodus. The immatures (recognized as such by their apparently unjointed short ovigers which are

closely appressed to the body rather than hanging vertically) are usually whitish and have only two propodial spines. However, at least one brown specimen was collected which still retained small ovigers and two propodial spines. Also, a few immatures were noted to have three spines instead of the usual two on some of the propodi. A set of propodi from such an animal was shown to Dr. Hedgpeth, and his tentative conclusion was that the pycnogonid had only partly undergone the adult molt—all the legs not molting at the same time—and would eventually possess three spines on all propodi.

Family PYCNOGONIDAE Wilson, 1878

Genus PYCNOGONUM Brunnich, 1764

Pycnogonum stearnsi Ives, 1892

This is a relatively common species taken at all three of the main collecting localities. It is generally restricted to the vicinity of sea anemones although two or three small individuals were taken on hydroids and in a Phyllospadix root mass. They sometimes occur in clusters of six or eight individuals around a single anemone. At Doran Beach over 100 animals, including many very small individuals, were removed from three rather small rocks where they were feeding upon Metridium senile. Possibly some were also feeding on another small reddish anemone since some of the pycnogonids showed viscera of a definite pink color.

At Duxbury Reef and at Rodriguez Ranch beach Metridium was not noted, or at least did not occur so commonly, and the pycnogonids were found at the bases of the larger individuals of Anthopleura xanthogrammica, usually on a more or less sheltered side of the anemone.

Many of the animals had the proboscis shallowly inserted into a small hole in the side of the column and were apparently feeding upon body juices or bits of the anemone. The pycnogonids did not seem to be using the claws on the tips of each leg to grasp the Anthopleura, and the contact made by the proboscis appeared to be the main holding force. These observations were, however, made upon anemones which were left dry by the receding tide, and it may be that under water the pycnogonids maintain a much stronger grip with the claws to prevent them-

selves from being swept away by water currents. The occasional beds of Anthopleura elegantissima in which the anemones were tightly pressed against one another did not seem to harbor any pycnogonids.

This genus seems well adapted morphologically to its existence on sea anemones and on the underside of rocks. The legs are short and stocky for a pycnogonid, and they tend to be kept stretched out laterally. The body is rather heavy but flattened dorso-ventrally so that the animal would seem to offer little resistance to water currents when closely applied to a relatively flat surface.

Pycnogonum rickettsi Schmitt, 1934

This species is listed as subtidal (Hedgpeth, 1941) and is possibly rare or at least not frequently collected along the California coast north of Monterey. Hedgpeth (1951) lists one collected at Tomales Point in 1938. However, at Bolinas on Duxbury Reef and the adjacent rocky shore this species may be found on Anthopleura xanthogrammica at tide levels of up to +2 or +3 feet. Twenty-seven were taken in such situations in one low-tide collecting period. This species, like P. stearnsi, was found out of water on the trunks of medium- and large-sized anemones. Several individuals were observed feeding in the manner of P. stearnsi as described in the account of that species. It was also found that P. rickettsi could be collected from anemones in tide pools merely by running the fingers around the sides of the anemones until a pycnogonid was felt. There seemed to be a tendency for the pycnogonids to occur higher up on the trunks of the water-covered anemones than on the trunks of the "dry" anemones. This is possibly because of a retreat on the part of the pycnogonids to the moister basal portion of the anemones to avoid desiccation as the tide lowers.

Young of this species resemble P. stearnsi in their whitish or pale flesh coloration, but a adult rickettsi appear dirty tan with a few dark brown or blackish markings on the back and legs, and they closely resemble the sand and silt which is present around the bases of the anemones.

The two species of Pycnogonum were not collected from the same individual anemone, but they were found on anemones

only a few feet apart, so it appears that in the Bolinas area, at least, the feeding habits of the two are quite similar.

LITERATURE CITED

Hedgpeth, J. W.

1941. A key to the Pycnogonida of the Pacific coast of North America. Trans. San Diego Soc. Nat. Hist., 9(26): 253-264.

-----, -----

1951. Pycnogonids from Dillon Beach and vicinity, California, with descriptions of two new species. Wasmann Jour. Biol., 9(1): 105-117.
Light, S. F., R. I. Smith, F. A. Pitelka, D. P. Abbott, and F. M. Weesner
1954. Intertidal invertebrates of the central California coast. Univ. of Calif. Press, XIV-446.

Deep Water Collecting off Guaymas, Mexico

by

DONALD R. SHASKY

Conchological Club of Southern California, Los Angeles

During December of 1959, while vacationing in Guaymas, Mexico, I had the privilege of spending two days aboard the General Yañez, a 65-foot shrimp trawler. During this time we used the boat exclusively to trawl for shells in water ranging in depth from 18-55 fathoms. The trawling was done in the vicinity of Cabo Haro, which is just west of the entrance to Guaymas Bay.

The trip was made possible through the generosity of Captain Xavier Mendoza of Productos Marinos de Guaymas. Besides Captain Mendoza and the author, others in the collecting party included Dr. Bruce Campbell and Todd Schowalter, also of the Conchological Club of Southern California, and Ivan Thompson of Brawley, California.

Many of the specimens are as yet unidentified, and there may be several new species to describe; however, a partial listing of those already identified will be of interest to those working in the Panamic area.

PELECYPODA

- Noetia delgada (Lowe, 1935)
Ostrea megodon Hanley, 1846
Pecten sericeus Hinds, 1845
Miltha xantusi (Dall, 1905), valves only
Echinochama californica Dall, 1903, valves only
Trachycardium belcheri (Broderip & Sowerby, 1829)
Lophocardium annettae (Dall, 1889)
Nemocardium pazianum (Dall, 1916)

GASTROPODA

- Turcica coffea Gabb, 1865, single specimen represented by apical fragment
Architectonica placentalis (Hinds, 1844)
Xenophora robusta Verrill, 1870
Natica colima Strong & Hertlein, 1937
Cymatium amictum (Reeve, 1844)
Distorsio constrictus (Broderip, 1833)
Distorsio decussatus (Valenciennes, 1832)
Maxwellia humilis (Broderip, 1833) (?)
Pterynotus inezana (Durham, 1950)
Pterynotus swansoni Hertlein & Strong, 1951, dead specimens only
Typhis coronatus Broderip, 1833
Coralliophila hindsii (Carpenter, 1857)
Strombina subangularis Lowe, 1935
Cantharus shaskyi Berry, 1959
Cantharus mendozana (Berry, 1959), dead specimen only
Metula amosi Vanatta, 1913
Cancellaria clavatula Sowerby, 1832
Trigonostoma bullatum (Sowerby, 1832)
Trigonostoma funiculatum (Hinds, 1843)
Gemmula hindsiana Berry, 1958
Ancistrosyrinx cedonulli (Reeve, 1843)
Knefastia tuberculifera (Broderip & Sowerby, 1829)
Clavus roseolus (Hertlein & Strong, 1955)
Tenaturris verdensis (Dall, 1919)
Turricula armilda (Dall, 1908)

We were particularly happy to get four specimens of Pterynotus inezana. Perhaps it will now be possible to work out its rela-